

# NMC Horizon Project: K-12 Edition

## 2009 Preview

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- Online Communication Tools

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## Time-to-Adoption: One Year or Less

### Collaborative Environments

A growing emphasis on collaboration in education and in the workplace has led to the proliferation of collaborative environments in online spaces designed to support teams working together. Online collaborative environments range from shared document editors like Google Docs (<http://docs.google.com>), to openly editable websites like wikis, to social networking sites that include profiles and communication tools to add a sense of connectedness and community along with tools for shared work. Virtual worlds such as Second Life are also a part of this category.

Collaborative environments are effective virtual spaces for sharing information. Some platforms such as Facebook allow members to embed user-generated multimedia including video, music, and images along with text into web pages to share with their network of friends. Online collaborative spaces like Ning or PageFlakes can be created easily by anyone interested in a particular topic for others interested in the same subject. Some teachers use online collaborative environments to manage their classrooms and to share resources with other teachers within a media rich environment. A common feature of all of these applications is a workspace that may be shared by students and their teachers with fewer geographic and time limitations than a physical classroom.

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- Students collect news stories online, share them with their network of friends and offer feedback and responses to the news media's perspective.
- Students synchronously collaborate online to create a mind map of course notes from their computer technology class.
- Teachers expand their professional knowledge through networks of teachers who have a shared affinity for a particular topic. Since social technology knows no geographic boundaries, it brings teachers who may be isolated within their schools in contact with people they might never work with otherwise.

### Examples

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- Voicethread facilitates secure online conversations around a shared document or documents about which students may comment via phone, voice recording, text, video, or uploaded files: <http://voicethread.com/#home>
- With MindMeister, users may edit graphic documents such as mind maps online as a group while working from a number of Web portals: <http://www.mindmeister.com/>
- Classblogmeister is a searchable network of classroom blogs and bloggers, both students and teachers: <http://classblogmeister.com/index.php>
- Classroom 2.0 uses the Ning online collaboration platform to support teachers interested in integrating Web 2.0 into the classroom: <http://www.classroom20.com>

### For Further Reading

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#### Collaborative Work Environments

<http://thinkofit.com/webconf/workspaces.htm>

(Maintained by David R. Woolley, updated September 2008.) This website includes reviews, articles, and links to services for online collaborative workspaces.

#### iCue

<http://www.icue.com/>

This site hosted by NBC presents news stories in a "collectible" format. Students may keep stories or share them with classmates along with their critical perspectives about the content.

#### Social Networks in Education

<http://socialnetworksined.wikispaces.com/>

This wiki site hosts an updateable list of social networks online that are used in school environments.

## Time-to-Adoption: One Year or Less

### Online Communication Tools

Because the nature of work has changed and people are working more remotely, the use of online communication tools is growing. These same shifts are mirrored in the lives of K-12 students. Programs like Skype allow free online video conferencing, which many young people already use to communicate with their extended families. Brief, synchronous online communication through instant messaging and Twitter, a microblog application, allow real time conversations not bound by physical space or time limits. Meebo, a web-based instant messaging aggregator, eliminates the need for schools to support software from a variety of instant messaging vendors by enabling access to different accounts in one interface.

Though many schools are cautious of introducing instant messaging into the classroom where it could be a distraction to students, the value of these technologies goes well beyond social interaction. Online communication tools provide students with invaluable experience in remote collaboration that prepares them for future careers. Desktop video conferencing knocks down classroom walls and brings subject experts and co-learners from all over the world into the classroom. And when a teacher inserts a chat feature into her classroom blog or website, suddenly school learning hours extend beyond those of the traditional school day.

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- Teachers manage classroom activities even outside of classroom hours through synchronous, two-way online communication that can provide time-sensitive information about projects and assignments and reach multiple students at once.
- Content experts in a field of study are invited into the classroom to spend time with students via desktop video-conferencing, without needing to leave their work.
- Without having to download any software onto the school's computer, a teacher can place a real time chat box into a blog entry so that students may comment and ask questions about content outside of classroom hours.

### Examples

- Edmodo is a private microblogging platform that teachers and students can use to manage classroom assignments and activities as well as for synchronous communication: <http://www.edmodo.com/>
- The free online telephone and video-conferencing program, Skype, allows students to broadcast current events to their classroom events and interact with their fellow students about the content in real time: <http://skype.com>
- Meebo allows synchronous, online chat from a variety of sources to be dropped into a website or blog to facilitate class discussion about a topic: <http://meebo.com>

### For Further Reading

#### Collaboration Tools

<http://connect.educause.edu/Library/ELI/CollaborationTools/47200>

(Cyprien Lomas, Michael Burke, and Carrie Lee Page, *EDUCAUSE Connect* (White Paper), August 2008.) This white paper discusses everyday communication tools used by students, ways that students already use them, and ways that faculty can leverage students' familiarity with and use of these tools to collaborate and extend discourse beyond the classroom.

#### Online Videoconferencing: Web Tools Such as uStream Make Video Broadcasting Accessible

[http://www.accessmylibrary.com/coms2/summary\\_0286-34670276\\_ITM](http://www.accessmylibrary.com/coms2/summary_0286-34670276_ITM)

(Gary Stager, *District Administration*, June 2008.) This article provides an overview of major online video technologies used in K-12 classrooms and examples of how they are used.

#### Skype Interview: Around the World with 80 School Projects

<http://langwitches.org/blog/2009/01/10/skype-interview-around-the-world-with-80-schools-project/>

This blog post features video of a Skype interview with technology integration facilitator, Silvia Tolisano who uses Skype to facilitate interactions with 80 schools for her school's Global Studies program.

## Time-to-Adoption: Two to Three Years

### Mobiles

Over the past few years, mobiles have undergone a continual transformation, becoming more capable and flexible with each new release. The ability to record audio and video turned them into tiny multimedia devices; as storage capacity increased, they became the storehouses of our digital lives; and geolocation, web browsing, and email has brought much of the functionality of a laptop to the pocket-sized devices. Then, a year ago, another transformation took place. Devices with touch screen displays appeared on the market. These new mobiles can access the Internet over the increasingly higher-speed 3G networks or by using wifi, and they can sense motion and orientation and react accordingly thanks to built-in accelerometers. They can use GPS to locate themselves and can run robust applications. They communicate with other devices. Most significantly, their manufacturers are working with the developer community to open up the devices to all the innovation that third-party developers can bring.

New interfaces, the ability to connect to wifi and GPS in addition to a variety of cellular networks, and the availability of third-party applications have created an almost entirely new device with nearly infinite possibilities for education, networking, and personal productivity. The implications for education are dramatic: the potential for mobile gaming and simulation, research aids, fieldwork, and tools for learning of all kinds is there, awaiting development.

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- Nearly every student carries a mobile device, making it a natural choice for content delivery and even field work and data capture: mobiles and their networks are virtually everywhere.
- Language learners can install applications on their mobiles that let them look up words, practice hearing and speaking, and practice writing.
- Detailed reference materials are available for medicine and astronomy; graphing calculator applications turn mobiles into sophisticated mathematical tools; hundreds of flash card applications are available for an array of subjects; and Google Earth now can be installed on mobile devices.

### Examples

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- ChemiCal is a chemical calculation application for the iPhone:  
<http://www.twssworldwide.com/ChemiCal.html>
- The iPhone version of Google Earth includes all the detail of the desktop version and is available in 18 languages: <http://googleblog.blogspot.com/2008/10/introducing-google-earth-for-iphone.html>
- Math tools like Kids' Fraction Fun help students practice skills they are learning in school in a game-like format on the iPod Touch: <http://www.nscpartners.com/kidsmathfun62233>
- Poll Everywhere uses short messaging service (SMS) messages to allow student response in place of expensive clicker systems: <http://www.pollerywhere.com/>
- Seismometer uses the iPhone's accelerometer to visualize and measure seismic variation.  
<http://iphone3g-india.com/detect-earthquake-using-iphone-seismometer-iphone-app/>

### For Further Reading

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#### How Mobile Is Changing Our Society

<http://tarina.blogging.fi/2008/10/18/speaking-at-mobile-monday-amsterdam/>

(Teemu Arina, *Tarina*, 18 October 2008.) This blog post explores the blurring boundary between mobile devices and computers and the potential future of what we now call mobiles.

#### iPhone: 3 Features That Will Impact Education

<http://www.edutechie.com/2007/06/iphone-3-features-that-will-impact-education/>

(Jeff VanDrimmen, *EduTechie.com*, 12 June 2007.) This blog post describes three features of the iPhone – multi-touch display, widgets, and iPhone applications with full Internet access.

#### Mobile Learning in Classrooms of the Future

<http://www.convergemag.com/story.php?catid=421&storyid=108262>

(Suren Ramasubbu & Bruce Wilcox, *Converge*, September 2008.) This article describes the potential of smart phones to revolutionize K12 education.

## Time-to-Adoption: Two to Three Years

### Cloud Computing

The emergence of large “data farms” — specialized data centers that host thousands of servers — has created a surplus of computing resources that has come to be called the *cloud*. Aspects of computing that used to be considered expensive, like disk storage and computing cycles, are now becoming cheap and ubiquitous. Layered on top of the cloud infrastructure are development platforms that are enabling thin-client, web-based applications for everything from image editing to word processing to music and video manipulation. Specialized applications like Flickr live entirely in the cloud; there is no single computer, or even specific group of computers, that can be pointed to as housing Flickr, Google, or YouTube. To the end user, the cloud is invisible; the technology that supports the applications doesn’t matter — the fact that the applications are always available is key.

There are three types of services associated with the cloud. The most straightforward set of services from an end-user perspective are cloud-based applications that serve a single function, such as Gmail (<http://gmail.com>) or Quicken Online (<http://quicken.intuit.com/online-banking-finances.jsp>). The next tier is one step removed from this: instead of offering end-user applications, these services offer the infrastructure on which to build such applications, along with the computing power to deliver them, like Google App Engine (<http://code.google.com/appengine/>) or Heroku (<http://heroku.com>). The final tier of cloud services are those that offer sheer computing resources without a development platform layer, like Amazon’s Elastic Compute Cloud (<http://aws.amazon.com/ec2/>) or the GoGrid (<http://www.gogrid.com>).

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- Cloud-based applications can provide students and teachers with free or low-cost alternatives to expensive, proprietary productivity tools.
- Browser-based applications are accessible for a variety of computer and even mobile platforms, making these tools available anywhere the Internet can be accessed.
- The shared infrastructure approach imbedded in the cloud computing concept offers considerable potential for large scale experiments and research that can make use of untapped processing power.

### Examples

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- CloudTrip is a fledgling directory of cloud-based applications, sorted into categories: <http://www.cloudtrip.com/index.php?category=Education>
- A partnership between SimTone Corporation and Frank Porter Graham Elementary School in Chapel Hill, North Carolina, will leverage cloud computing technologies to provide students and staff with virtual computers: <http://www.simtone.net/snapbook.htm>
- Collections of images can be used for research or learning in a wide range of disciplines; for instance, histology images on Flickr: <http://www.flickr.com/search/?w=all&q=histology&m=text>

### For Further Reading

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#### Computing Heads for the Clouds

[http://www.businessweek.com/technology/content/nov2007/tc20071116\\_379585.htm](http://www.businessweek.com/technology/content/nov2007/tc20071116_379585.htm)

(Aaron Ricadela, *Business Week*, 16 November 2007.) This article defines cloud computing and describes ways it is in use by IBM, Yahoo!, and Google.

#### Down on the Server Farm

[http://www.economist.com/business/displaystory.cfm?story\\_id=11413148](http://www.economist.com/business/displaystory.cfm?story_id=11413148)

(*The Economist*, 22 May 2008.) This article describes the infrastructure of Internet computing and its implications for the future.

#### How Cloud Computing is Changing the World

[http://www.businessweek.com/technology/content/aug2008/tc2008082\\_445669.htm](http://www.businessweek.com/technology/content/aug2008/tc2008082_445669.htm)

(Rachael King, *Business Week*, 4 August 2008.) This article describes a perceived shift in the way we think about computing.

## Time-to-Adoption: Four to Five Years

### Smart Objects

A smart object is simply any physical object that includes a unique identifier that can track information about the object. There are a number of technologies that support smart objects: radio-frequency identification (RFID) tags, quick response (QR) codes, and smartcards are some of the most common. The thing that makes smart objects interesting is the way they connect the physical world with the world of information. Smart objects can be used to digitally manage physical things, to track them throughout their lifespan, and to annotate them with descriptions, opinions, instructions, warranties, tutorials, photographs, connections to other objects, and any other kind of contextual information imaginable. Thus far, smart objects are awkward to tag and difficult to scan for the everyday user, but that is beginning to change as manufacturers create user-friendly systems for tagging, scanning, and programming smart objects.

The vision for the future of smart object technology is a world of interconnected items in which the line between physical object and digital information is blurred. Applications that tap into “the Internet of things,” as this vision is called, would assist users in finding articles in the physical world in the same way that Internet search engines help locate content on the web. Reference materials, household goods, sports equipment: an actual instance of anything a person might need would be discoverable using search tools on computers or mobile devices. Further, while looking at an object, a prospective buyer could call up reviews, suggestions for alternate or related purchases, videos of the item being used, and more, as well as finding out whether something similar lay forgotten in the garage back home.

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- Libraries use smart tags to track books and assist with check-in and check-out.
- Students examining tagged cultural objects brought into the classroom could use handheld devices like the iPod Touch to call up a wealth of information, including photographs, maps, video and audio recordings, related to the object they are holding.
- A school- or community-wide scavenger hunt might make use of QR codes or other smart tags to offer clues for participants and direct them to certain locations.

### Examples

- The Illinois Institute of Technology’s ThinkeringSpace combines physical and virtual components to produce an environment where physical objects, like books, can be annotated with contextual information that is added manually or retrieved automatically: <http://www.id.iit.edu/ThinkeringSpaces/>
- Semapedia is a collaborative project that aims to connect tagged physical objects with online information from Wikipedia using QR codes: <http://semapedia.org>
- The Attendee Meta-Data Project at the 2008 Hackers on Planet Earth conference was intended to bring conference-goers together based on shared interests, recommend sessions to attendees, and facilitate hallway networking: <http://amd.hope.net>

### For Further Reading

#### Internetting Every Thing, Everywhere, All the Time

<http://edition.cnn.com/2008/TECH/11/02/digitalbiz.rfid/>

(Cherise Fong, *CNN.com/technology DigitalBiz*, November 2008.) This article describes the Internet of things and illustrates some current examples of smart object technology.

#### The Net Shapes Up to Get Physical

<http://www.guardian.co.uk/technology/2008/oct/16/internet-of-things-ipv6>

(Sean Dodson, *Guardian.co.uk*, October 2008.) This article describes the “Internet of things” and discusses the technologies involved, as well as considering potential applications for networked smart objects.

#### iPhone in Education: Using QR Codes in the Classroom

<http://olliebray.typepad.com/olliebraycom/2008/11/iphone-in-education-using-qr-code-in-the-classroom.html>

(Ollie Bray, *OllieBray.com*, 24 November 2008.) The author explains and demonstrates a way to use QR codes to convey homework assignments to students.

## Time-to-Adoption: Four to Five Years

### Personal Web

Part of a trend that began with simple innovations like personalized start pages, RSS aggregation, and customizable widgets, the personal web is a term coined to represent a collection of technologies that confer the ability to reorganize, configure and manage online content rather than just viewing it. Using a growing set of free and simple tools and applications, it is easy to create customized, personal web-based environments that explicitly support one's social, professional, learning and other activities via highly personalized windows to the networked world. Online material can be saved, tagged, categorized, and repurposed without difficulty and without any special knowledge of how web pages are put together. In fact, the underlying technology that supports the web has all but vanished for most users; all that is necessary is to know which tools to use, and any task — from creating and distributing class materials, to organizing groupwork and team tasks, to developing a library of resources that constantly refresh and update themselves — becomes point-and-click trivial.

As a result, students can create customized, personal web-based environments to support their social and academic activities using whatever tools they prefer. Tools that foster personal and social forms of learning and expression, though technically unrelated, work together seamlessly without any need for complicated setup, thanks to open applications programming interfaces (APIs) and easily integrated web feeds. Teachers can easily create online spaces for their classes that contain just the information they want their students to see, and students can create — and work in — online spaces that reflect their own interests and studies. The vast collection of content that makes up the web can be tamed, filtered, and organized, and anyone can publish as much or as little as they wish: the web has become personal.

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- The ease of online publishing gives students a place to voice their ideas, opinions, and research.
- Personal learning environments help students organize their own work as well as manage online references and resources.
- Personal publishing sites that offer printing services make it possible to create tangible products of student work, customized and inexpensive textbooks, and more.

### Examples

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- SmARThistory is an edited online art history resource to augment or replace traditional art history texts: <http://smarthistory.org>
- Studywiz Spark is a commercial product that allows teachers and students to create content-based learning spaces, accessible by computer or mobile device: <http://studywizspark.com>
- Eduglu is a content aggregator developed for educational use that includes a rating system: <http://eduglu.learningparty.net>

### For Further Reading

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#### Datagogies, Writing Spaces, and the Age of Peer Production

[http://writersatwork.us/sites/Joel\\_Moxley/Articles/datagogies.pdf](http://writersatwork.us/sites/Joel_Moxley/Articles/datagogies.pdf)

(Joseph Moxley, *Computers and Composition*, Vol. 25, Issue 2, 2008; pp. 182-202.) This article (PDF, 676k) suggests that a different kind of teaching and learning takes place in learning communities that use peer-to-peer technologies.

#### The Evolution of Personal Publishing

[http://www.readwriteweb.com/archives/the\\_evolution\\_of\\_personal\\_publ.php](http://www.readwriteweb.com/archives/the_evolution_of_personal_publ.php)

(Alex Iskold, *ReadWriteWeb*, December 2007.) This post traces different categories of personal publishing – blogs, social networks, and microblogs – and posits that each appeals to a different type of writer and fills a particular purpose in social publishing.

#### A Widget Onto the Future

<http://www.insidehighered.com/news/2008/12/08/widgets>

(Andy Guess, *Inside Higher Ed*, 8 December 2008.) This article describes widgets — tools for personalizing online information — and provides examples of some developed expressly for education.



## Critical Challenges

**1. There is a growing need for formal instruction in key new skills, including information literacy, visual literacy, and technological literacy.** The skills involved in writing and communication have changed from those required even a few years ago. Students need to be technologically adept, to be able to collaborate with peers all over the world, to understand basic content and media design, and to understand the relationship between apparent function and underlying code in the applications they use daily. Questions of assessment and support of new literacies across the curriculum continue to surface. Teachers, too, need training in these skills in order to support and guide students in visual communication and learning with technology. Before such training can take place, we need a fuller understanding of what constitutes new literacy skills.

**2. Students are different, but educational practice and the material that supports it is changing only slowly.** Schools are still using materials developed to teach the students of decades ago, but today's students are actually very different in the way they think and work. Schools need to adapt to current student needs and identify new learning models that are engaging to younger generations. Many education professionals feel that a shift to a more learner-centered model focused on the development of individual potential instead of the imposition of a body of knowledge would lead to deeper and more sustained learning across the curriculum. To support such a change, both teaching practice and the tools used in the classroom must adapt. Assessment, likewise, has not kept pace with new modes of working, and must change along with teaching methods, tools, and materials.

**3. Learning that incorporates real life experiences is not occurring enough and is undervalued when it does take place.** This challenge is an important one in K-12 schools, because it results in a lack of engagement in learning on the part of students who are seeking some connection between their own lives and their experience in school. Use of technology tools that are already familiar to students, project-based learning practices that incorporate real-life experiences, and mentoring from community members are a few practices that support increased engagement. Practices like these may help retain students in school and prepare them for further education, careers, and citizenship in a way that traditional practices are failing to do.

**4. There is a growing recognition that new technologies must be adopted and used as an everyday part of classroom activities, but effecting this change is difficult.** Technology tools that are part of everyday life for many students and working professionals should be seen as core tools of the teaching profession that teachers are required to master as any professional would master the tools of his or her trade. However, making such a profound shift in a well-established system is a difficult challenge. Professional development, intellectual interactions with peers, adequate training, and preparation time — all scarce resources for teachers — are necessary for such a shift to take place.

**5. A key challenge is the fundamental structure of the K-12 education establishment.** While the focus remains on maintaining the basic elements of the existing system, there will be resistance to any change in practice that upsets the status quo. Learners have increasing opportunities to take their education into their own hands, and options like informal education, online education, and home-based learning are attracting students away from traditional educational settings. If the system is to remain relevant it must adapt.



## Key Trends

**1. Technology continues to profoundly affect the way we work, collaborate, communicate, and succeed.** Information technologies impact how people work, play, gain information, and participate in communities. Increasingly, it is also a component of success in almost every endeavor, as those who can use the technologies to a greater extent are more likely to advance, while those without access or skills lose out. The digital divide was once seen as an "earning divide" but is now more of a "learning divide," with those who have access to education in a better position to obtain and make use of technology than those who do not. Evolving occupations, multiple careers, and an increasingly mobile workforce are aspects of this trend.

**2. Technology is increasingly a means for empowering students, a method for communication and socializing, and a ubiquitous, transparent part of their lives.** Technology is impacting our lives, and the lives of students, in new and expanding ways. Once seen as an isolating influence, technology is now recognized as a primary way to stay in touch and take control of one's own learning. Multisensory, ubiquitous, and interdisciplinary, technology is integrated into nearly everything we do.

**3. The web is an increasingly personal experience.** We have an unprecedented level of control over online content, not only in terms of the information and activities that we select, but also in the way they are represented to us. Students are very familiar with the idea of "skinning" — customizing the look and feel of — their virtual experiences. They expect and experience personalized content in games and websites that is at odds with what they find in the classroom.

**4. The ways we think of learning environments is changing.** Traditionally, a learning environment has been a physical space, but the idea of what constitutes a learning environment is changing. The "spaces" where students learn are becoming more community-driven, interdisciplinary, and supported by technologies that engage virtual communication and collaboration. This changing concept of the learning environment has clear implications for schools, where learning is the key focus of the space.

**5. The perceived value of innovation and creativity is increasing.** Innovation is valued at the highest levels of business and must be embraced in schools if students are to succeed beyond their formal education. The ways we design learning experiences must reflect the growing importance of innovation and creativity as professional skills.